

Claims

1. A compressor having a piston cylinder assembly for successive suction and discharge of a compressible fluid, thereby increasing fluid pressure of said compressible fluid in a substantially closed chamber, wherein said piston cylinder assembly comprises a piston, a cylinder, a cylinder bore, a suction plenum having a suction valve, and a discharge plenum having a discharge valve, said compressor comprising:
 - at least one piezoelectric element;
 - a primary displacement member coupled to said at least one piezoelectric element;
 - a secondary displacement member coupled to said piston; and
 - a non-compressible fluid disposed to fill a fixed predetermined volume between said primary displacement member and said secondary displacement member;wherein electrical actuation of said at least one piezoelectric element is controllable to displace said primary displacement member by a predetermined distance, said primary displacement member being coupled via said non-compressible fluid to displace said secondary displacement member by an amplified distance based upon said fixed predetermined volume.
2. A compressor in accordance to claim 1, wherein said at least one piezoelectric element is adapted to receive electrical signals for electrical actuation.
3. A compressor in accordance to claim 2, wherein said electrical signals comprises a series of voltage pulses.
4. A compressor in accordance to claim 2, wherein said electrical signals comprises a series of current pulses.
5. A compressor in accordance to claim 1, further comprising a stopper and a piston spring, said piston spring disposed between said stopper and said secondary displacement member.

6. A compressor in accordance to claim 1, wherein said non-compressible fluid comprises hydraulic oil or compressor lubricating oil.
7. A compressor in accordance to claim 1, wherein surface area of said primary displacement member in contact with said non-compressible fluid is larger than surface area of said secondary displacement member in contact with said non-compressible fluid.
8. A compressor having a piston cylinder assembly for successive suction and discharge of a compressible fluid, thereby increasing fluid pressure of said compressible fluid in a substantially closed chamber, wherein said piston and cylinder assembly comprises a piston, a cylinder, a suction plenum having a suction valve, and a discharge plenum having a discharge valve, said compressor comprising:
 - at least one piezoelectric element;
 - a primary displacement member coupled to said at least one piezoelectric element;
 - a secondary displacement member coupled to said piston; and
 - a non-compressible fluid disposed to fill a fixed predetermined volume between said primary displacement member and said secondary displacement member;wherein, in response to electrical actuation of said at least one piezoelectric element, displacement of said secondary displacement member is amplified relative to displacement of said primary displacement member, said displacements being based upon said fixed predetermined volume and surface areas of said primary displacement member and said secondary displacement member in contact with said non-compressible fluid.
9. A compressor in accordance to claim 8, wherein said at least one piezoelectric element is adapted to receive electrical signals for electrical actuation.
10. A compressor in accordance to claim 9, wherein said electrical signals comprises a series of voltage pulses.
11. A compressor in accordance to claim 9, wherein said electrical signals comprises a series of current pulses.

12. A compressor in accordance to claim 8, further comprising a stopper and a piston spring, said piston spring disposed between said stopper and said secondary displacement member.
13. A compressor in accordance to claim 8, wherein said non-compressible fluid comprises hydraulic oil or compressor lubricating oil.
14. A compressor in accordance to claim 8, wherein surface area of said primary displacement member in contact with said non-compressible fluid is larger than surface area of said secondary displacement member in contact with said non-compressible fluid.
15. A fluid conveying apparatus having a piston cylinder assembly for successive suction and discharge of a fluid, wherein said piston and cylinder assembly comprises a piston, a cylinder, a suction plenum having a suction valve, and a discharge plenum having a discharge valve, said fluid conveying apparatus comprising:
- at least one piezoelectric element;
 - a primary displacement member coupled to said at least one piezoelectric element;
 - a secondary displacement member coupled to said piston; and
 - a non-compressible fluid disposed to fill a fixed predetermined volume between said primary displacement member and said secondary displacement member;
- wherein, in response to electrical actuation of said at least one piezoelectric element, displacement of said secondary displacement member is amplified relative to displacement of said primary displacement member, said displacements being based upon said fixed predetermined volume and surface areas of said primary displacement member and said secondary displacement member in contact with said non-compressible fluid.
16. A fluid conveying apparatus in accordance to claim 15, wherein said at least one piezoelectric element is adapted to receive electrical signals for electrical actuation.
17. A fluid conveying apparatus in accordance to claim 16, wherein said electrical signals comprises a series of voltage pulses.

18. A fluid conveying apparatus in accordance to claim 16, wherein said electrical signals comprises a series of current pulses.
19. A fluid conveying apparatus in accordance to claim 15, further comprising a stopper and a piston spring, said piston spring disposed between said stopper and said secondary displacement member.
20. A fluid conveying apparatus in accordance to claim 15, wherein said non-compressible fluid comprises hydraulic oil or compressor lubricating oil.
21. A fluid conveying apparatus in accordance to claim 15, wherein surface area of said primary displacement member in contact with said non-compressible fluid is larger than surface area of said secondary displacement member in contact with said non-compressible fluid.